



MAGAZINE

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FRONT COVER: *Mountains and farmlands near Lake Taupo in New Zealand. Photograph by Brian Brake*

OUR CONTRIBUTORS

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I.C.I.'s New Copper Tube Mill

By Dorothy Thomas (Metals Division)

Last month the Press were invited to see Kirkby Works, the largest copper tube factory in Britain. Here is a description of this superbly functional industrial masterpiece, where under one roof tubes of almost any size are made on newly designed draw benches by methods which challenge comparison with any in the world.

KIRKBY is the largest copper tube factory in the United Kingdom. Its main mill—more than seven acres under one roof—is the biggest single production unit in the British non-ferrous industry and houses the most powerful tube-drawing machinery in the world.

Five years ago, the 50-acre site bordering the East Lancashire road was open country. It was, however, an ideal location for the new factory. There was ample space for current needs and for possible future expansion; local authorities welcomed a promising new outlet for the area's abundant manpower; and only seven miles away Liverpool's transport and dock facilities stood ready to take in copper supplies and speed the factory's products to all parts of the world.

For many years the Division's tube-producing units had been handicapped by the struggle to fit larger and more powerful plant into already crowded workshops. Now Metals Division engineers had before them a

rare and exciting opportunity to lay out plant to the best advantage and plan from scratch the buildings which would house it. In collaboration with Sir Percy Thomas, the consulting architect, a factory was designed which was not only an asset to the neigh-

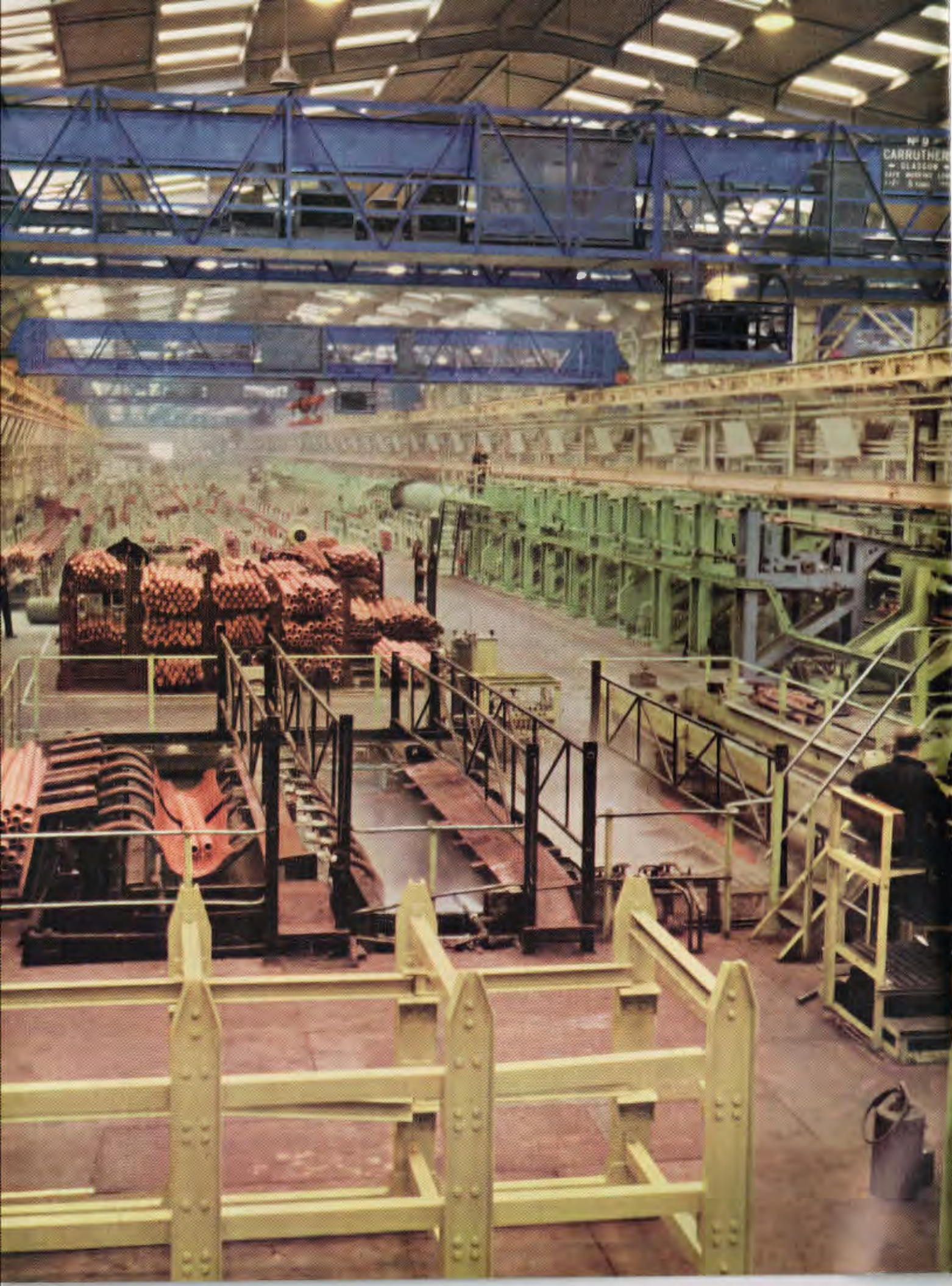
bourhood but the answer to a tube manufacturer's prayer.

Building operations were started in the winter of 1949 and pursued with such vigour that less than a year later Kirkby Works welcomed its first official visitors. To be sure, offices and workshops were little more than empty shells and mud still oozed sullenly at the door; but the great new factory was an accomplished fact. The chairman of the Metals Division said then that he felt like a farmer, pointing out green shoots just showing above the ground and explaining proudly that some time hence there would be a magnificent harvest.

Today no agricultural metaphor could do justice to the pace and power of Kirkby's existence. It is a factory where highly mechanised mass production techniques hold undisputed sway, where stages of manufacture are geared so accurately that the main production line operates as smoothly as a single great machine. This in itself is not, of course, unusual in a modern factory. The triumph lies in its application



THE MAIN ROAD OF KIRKBY WORKS. The building on the right is the casting shop and that in the centre the main production building.



to the tube-making industry, where the products are heavy, awkward to handle and almost endlessly varied.

Variety of Customers

Kirkby's principal raw material is copper. A big proportion of this goes into tubes for domestic water and gas services, which alone vary in diameter from $\frac{1}{8}$ in. to 4 in., and in length from straight runs of 16–20 ft. to coils three times as long. A big customer is the shipbuilding industry, which sends in orders for small quantities of tubes in a wide range of sizes, including some very large ones. For this purpose and for the chemical industry Kirkby might be called on to produce tubes up to 17 in. in diameter and weighing perhaps three-quarters of a ton. At the other extreme are fine tubes, slender as matches, which go into refrigerators, while in between are products to meet all the multitudinous demands of general engineering.

There was no question, then, of Kirkby turning out thousands of miles of tube, like spaghetti, by simple repetitive processes. Plant had to yield as nearly as possible a mass production flow line and still be unusually versatile. Metals Division engineers solved the problem by designing, together with machinery contractors, plant which produced tubes faster, in longer lengths and with less labour than anything so far known to the industry in this country. New drawbenches were designed which had great power and every conceivable mechanical handling aid, and plant layout saw to it that they were used to full capacity.

Massive Scale

Matching these ambitious plans, Kirkby's main tube mill was built to a suitably massive scale, and today it is an industrial masterpiece. Almost a third of a mile long and 60 ft. high, spanned by a triple-arched 200 ft. roof, the area is divided lengthwise into three bays; two of these, each 90 ft. wide, house all the factory's drawbenches and ancillary production equipment, and the third is devoted to the service sections. Superbly functional, it is also singularly attractive, with its colour scheme of cream, pale green and deep blue forming an effective background for the shining copper.

A particularly impressive feature is the mill's complement of giant cranes. Eleven of these, 85 ft. from side to side, travel up and down the production bays, lifting and carrying several tons of tubes with effortless precision. Others, moving crabwise along the walls, manoeuvre their elegantly named swan necks

into coils of tube and drop them, like giant hoop-la rings, over storage arms.

Tube-making does not begin here, however, but in the nearby Casting Shop. This bears as much resemblance to the traditional casting shop as a passenger steamer does to a canal barge. Light and airy, it bears Kirkby's unmistakable stamp of originality. True, the process of melting copper and pouring it into moulds is basically unchanged, but this is done without any of the sweating effort characteristic of the job. The huge furnace is, in fact, reminiscent rather of the chemical industry, fulfilling its function secretly and silently.

Continuous Casting

Slabs of virgin copper, carried by truck along an overhead platform, are fed continuously into the furnace and melted in an electric arc furnace. All the time molten copper trickles from the open mouth of the furnace, where—five tons of it every hour—it runs down twin runways into the waiting moulds. Cylindrical in shape, these are fitted eighteen at a time into rotating tables, one on either side of the furnace mouth. The caster sits at a small control panel, directing the flow so that it fills all the moulds in turn; as soon as the metal has solidified the moulds discharge their contents into a pit, and they roll down a ramp into a bath of cooling water.

Though to the onlooker it seems as simple as filling teacups from an urn, pouring is in fact a most important stage in production, as any interruption in the steady flow will cause a flaw in the cast metal. Since the smallest moulds in use at Kirkby hold 165 lb. of copper, no little skill is required to produce perfect castings.

Piercing the Billet

Taken by truck to the "in" end of the main mill, the billets are transformed into shells (embryo tubes with a hole down the middle) as they journey swiftly through rotary piercing machines or extrusion presses—the choice depends generally on the purpose for which the tube is wanted.

The pierced shell is still far from the dimensions required of the finished tube, so forcible slimming continues. This is where Kirkby's pride and joy, the 300,000 lb. breaking-down bench, comes into its own. Its task is to force the shells through dies of gradually decreasing diameter so that, like plasticine pulled through the fingers, they become longer and thinner.

(Text continued on page 299, photographs on page 302)

VERTEGENWOORDIGER

BETWEEN the Hook of Holland and The Hague lies a stretch of land that sparkles almost as brightly as the sea that borders it. In this area, known as the Westland, stand 60% of the world's glasshouses, and here the Plant Protection products sold by I.C.I. (Holland) gain a ready market.

Dick de Graaff, a *vertegenwoordiger* to his fellow countrymen and a sales representative to you and me, specialises in the sale of Plant Protection products. He confirmed what I had heard in England, that Holland is a tough, competitive market. "My countrymen are very shrewd people," he said. "They know exactly what they want and how much they mean to pay for it, and within those limits they don't mind who they buy it from."

We drove down the level roads flanked by glasshouses. The market gardens were interlaced with canals, and barges piled high with cauliflowers, tomatoes, melons, cucumbers and all kinds of flowers were plying towards the cities on their way to the export markets across the borders and over the sea.

De Graaff was on his way to see a customer, the manager of one of the agricultural stores which stock everything from fruit sprays to tin-tacks. He feared it would be an awkward interview. The customer wanted more 'Shirlan' to sell to growers troubled with cucumber mildew. But 'Shirlan' would be in short supply for the next two weeks.

Sure enough, as soon as *goeden morgen* had been exchanged and cigars handed round, the agricultural merchant tackled de Graaff earnestly about 'Shirlan.' "We must have more, mijnheer," he said. "All the growers are asking for it and our stocks are nearly finished. Can't you do something about it?" De Graaff promised his best efforts, and we came away. But he was anxious that I should not take home a rosy picture of products selling themselves and merchants beseeching him for fresh supplies. "'Shirlan' sells easily at the moment," he said. "It is well established, and has gained the approval of the research establishments—and that is what counts here."

Dutch growers, he explained, are very strongly influenced by the opinion of their official and semi-official advisory services. Growers' co-operatives run their own research stations, and there is a large national research station at Wageningen. All new crop and plant protection products have to be tested at Wageningen, and without the

official seal of approval may not be used in Holland. Wageningen, moreover, decrees the quantity and method to be used in applying a product—which may differ from the manufacturer's recommendations. Daily radio bulletins announce to market gardeners and farmers which products are recommended for the seasonal pests.

This means that much of de Graaff's work is in the nature of supervising applied research, visiting stations and market gardens where Plant Protection products are on test. As an example of this he took me to visit a research station at Aalsmeer which is devoted to testing products for use by flower-growers.

Here a new Plant Protection product, still on the secret list, was being applied experimentally. De Graaff conferred with the experts at some length, and then we moved on to see the manager of a depot belonging to a farmers' co-operative. In spring de Graaff sells him large quantities of 'Agroxone' for killing weeds on pasturelands. Now he was trying to interest him in a new product. The co-operative manager was typical in that he kept himself up to date with the technicalities of fertilizers and crop protection by attending courses. He could not be dazzled by a new trade name. He wanted details of formulation, and to know why this product was better than others.

Keeping abreast of competitors' activities is important for de Graaff, and in the afternoon we visited an agricultural fair which was being held to celebrate the centenary of the Haarlemmermeer—a vast area of land reclaimed from the sea. At the fair de Graaff closely scrutinised the stands of competitors from Holland, Belgium, France, Germany and England, all of which are fighting for the rich Dutch market.

De Graaff's territory is the whole of Holland—12,800 square miles—and he travels 28,000 miles a year in his car. Spring is his busiest season for selling; in summer he concentrates on applied research, in winter on propaganda by personal interviews, lectures and film shows—sometimes he shows Plant Protection films to as many as ten different audiences in a week. All the time he must supervise advertising and the repacking of products imported in bulk from England. Once or twice a year he visits England to meet Plant Protection executives and keep himself informed of the latest research at Fernhurst. "I manage," he said in an understatement typical of the hard-working Dutch, "to keep quite busy." M.J.D.



Dick de Graaff

Information Notes

THE VERSATILE POWER CARTRIDGE

By Robert Wark (Nobel Division)

Power cartridges were on the secret list during the war. They were used for the quick starting of fighter planes and for freeing planes from entanglement in barrage balloon cables. Today new uses have been found in industry for an ingenious device that harnesses the energy of exploding gases.

POWER cartridges are first cousins to rifle cartridges and gun ammunition. Both have common stock in a basic idea—the harnessing for work of gases swiftly released by chemical reaction. These cousins, however, are of different ages and characters. Power cartridges are younger and of milder disposition.

The power cartridge is a gas-producing device which does mechanical work. In this it differs from a rifle or gun cartridge, in which the energy of gases evolved from the solid propellant charge is very quickly transformed into the rapid movement of bullet or projectile. In a rifle or gun the pressures developed by the burning propellant may reach several tons per square inch, but with power cartridges the pressures are rarely more than a few hundred pounds per square inch.

Different types of power cartridges are used for different purposes. First to be developed were devices in which the gases generated moved through short distances a projectile of a special kind or a piston with a special attachment. Some examples are:

1. *The submarine bolt driving apparatus*, which is of great use for effecting repairs on ships' plates under water. The charge is in small pieces and quick burning, and the device is a gun which fires a projectile—the bolt.
2. *The humane cattle killer*. Instead of a free bullet, the humane cattle killer is a blank cartridge containing propellant in small pieces. The gas from this propellant forces the captive bolt into the head of the animal.
3. *A device for cutting barrage balloon cables fouling the leading edge of the wings of an aircraft*. The power car-

tridge actuates a cutting device which frees the cable.
4. *A device for squeezing refractory cement into the cracks and linings of hot gas retorts*.

A different sort of use for the power cartridge is the starting of engines. Diesel engines are frequently difficult to start from cold. The power cartridge can assist.

Gases from a relatively quick burning cartridge, housed in an external breech, can be fed through a short pipe and valve to one cylinder of a diesel engine which has been preset so that the engine piston is slightly over top dead centre. As the gas pressure develops, the piston is pushed rapidly downwards and sufficient energy is imparted to the flywheel to give it several turns. The engine should then start firing. When the cartridge is burned out, the special valve which feeds the gases closes.

Over nine million of these cartridges, containing a charge weighing slightly less than $\frac{1}{2}$ oz. in the form of small tubes, have been sold to Messrs. Marshall of Gainsborough for starting their single-cylinder diesel tractor engine.

In another version of this application the cartridge is inserted directly into the cylinder head and no valve is necessary. This method is cheap and is mainly suitable for slow-running diesel engines with heavy flywheels and not more than two cylinders.

Yet another method of starting engines is the independent

cartridge-operated starter in which the power cartridge is housed in a breech, from which the gases are piped. This starter generally has a single piston, the movement of which is transformed into the rotation of a dog clutch which engages with a similar dog at the end of the engine



A Field Marshall tractor about to be started by hitting a pin which fires the power cartridge

shaft. The power is supplied to the engine for approximately one rotation of the shaft. This gives sufficient energy to overcome several engine compressions.

These independent starters have been used for starting aero piston (petrol) engines, certain industrial stationary diesel engines, military diesel generator sets and lifeboat diesel engines. For them twenty million cartridges have been supplied by Metals Division, mainly on order for the Ministry of Supply. Commercial demand has been only small. During the last war this was the method used for the quick starting of some fighter engines in the R.A.F.

When the turbo-jet engine came along, the existing cartridge-operated starters were found to be too quick-acting. Special turbo starters have now been developed.

A NEW ANTISEPTIC

By D. P. Allen (Pharmaceuticals Division)

I.C.I. research led recently to the introduction of a new antiseptic called 'Hibitane.' Here is the story of its discovery and of its special advantages.

THE history of surgery has been divided into two eras, before Lister and after Lister. This Edinburgh pioneer in antiseptic sought to perfect a system of preventing the entry of bacteria into a wound and of destroying by carbolic acid those already present. Carbolic acid, however, had the serious disadvantage of being caustic, injuring the tissues and so delaying healing. It was also poisonous.

Lister himself, and others who have followed after him, made strenuous efforts to discover a perfect antibacterial compound which would be fully effective against all disease-producing organisms and yet be harmless to man. Many substances have been introduced and have been widely used, but all possess inherent shortcomings.

Some three years ago I.C.I. scientists at Blackley were investigating the biological properties of certain intermediate compounds of the well-known antimalarial drug 'Paludrine.' These compounds, known as polydiguamides, were discovered to possess marked antibacterial activity against a wide range of organisms. One compound of the bisdiguamide group in particular, which was labelled in those early days with the experimental number of 10,040, exerted a most powerful effect in preventing the growth of bacteria. Concentrations of as low as 1 : 2,000,000



... efforts to discover

They usually incorporate single turbine wheels operated by steady pressures from a jet, or systems of jets, conveying the pressure gases from a cartridge. Through suitable gearing the turbine wheel works a dog clutch which engages with a dog on the compressor shaft. Since the burning times necessary extend to several seconds, large single-tube charges have been developed, and relatively cool propellants are necessary.

Power cartridges are also used as the motive power to lower aeroplane undercarriages in an emergency. They are solid cylindrical charges which burn cigarette fashion from one end to the other, and the pressure fed to the jacks lasts, comparatively speaking, a long time. A similar cartridge has been used to operate fire extinguishers and safety drenching systems.

were sufficient to inhibit the growth of certain streptococcal micro-organisms.

This compound, known chemically as *bis-p-chlorophenyldiguamido-hexane*, was subjected to further investigations. Various salts were prepared, and preparations containing them were subjected to extensive clinical trials in hospitals. Two papers on this work were published earlier this year in the medical press.

The compound is now known by the name of 'Hibitane.' Creams containing 1% of the diacetate salt have been shown in the trials to be highly effective for disinfecting the skin, lasting superficial sterility being very quickly achieved with liberal application. The antiseptic effect exerted on the skin is estimated to be virtually the same as that of iodine. 'Hibitane' is quite unrelated to all other antiseptic compounds. It is highly effective against a wide range of bacteria, acts very rapidly, and has a persistent effect on the skin. It also possesses the outstanding advantage of being safe and non-irritating.

Various preparations have now been developed. For general antiseptic purposes 'Hibitane' Powder and 'Hibitane' Concentrate are available, together with two creams, 'Hibitane' Antiseptic Cream and 'Hibitane' Obstetric Cream, both of which have specialised medical applications.

Extensive investigations and trials have also been carried out in the veterinary field. Three veterinary preparations have so far been developed. Two of these are available to the veterinary surgeon, namely 'Hibitane' Intramammary Cream for the treatment of resistant bovine mastitis; and 'Hibitane' Pessaries, an entirely novel product for treating metritis and endometritis in cattle. The third 'Hibitane' product is I.C.I. Udder Wash, available to farmers.

THOUGHTS ON READING B. R. GOODFELLOW

B. R. Goodfellow's article on mountaineering last August has provoked one reader into writing to the editor. Here is the irreverent story of a mountaineering expedition that was not according to copybook.

By Helen Kenyon (Salt Division)

It all started in Interlaken, Switzerland, where I was on holiday with my cousin, and it was there that I caught my first glimpse of a real mountain—the Jungfrau. I could not have chosen a prettier one, nestling there between two others, and I felt the urge to get to the top. But how?

"There is a train, I believe, which will carry us to the top," said Mary. So without more ado we bought two tickets (returns) and set off the following morning with a summit in view. Slowly the train crawled up and up steep gradients and startlingly close to the edge of equally steep drops. As the train shuddered upwards I decided to co-operate by easing myself off my seat a little to help it along just in case one of the brakes had become overstrained. Apparently, so they say, there are eight safety devices on these mountain trains, and every time the train lurched I struck one off the list.

I was just considering how to deal with the situation if it lurched once more when the Swiss guide came round to us all and told us that when we reached the terminus we could do several things. We could see the ice palace, take a toboggan ride, see the observatory, or do a short climb with him on one of the peaks.

Only Mary and I seemed interested in a climb, so just for the fun of the thing we made an appointment with the guide, Hans, and a peak, though I did not know then that it was "with fear" as well. Hans then told us that when we reached the terminus (which was called the Jungfraujoch, some 11,000 ft. up) we might feel dizzy or even faint away due to the thin air up there. Eventually we reached the terminus and walked quite healthily to the restaurant, where we had a bowl of hot soup.

"That was delicious!" I remarked, and in reply Mary murmured something about it probably being our last as we set forth to meet Hans and the peak. On our way we borrowed (on payment) a ski-ing stick each and climbing boots.



... a real mountain

Hans was waiting for us, complete with an ice pick, a coil of rope and a serious expression on his face. If I was going to faint at all this seemed a good moment to do it; but I only succeeded in shivering, and not with the low temperature either! Did he know, I wondered, that neither of us had ever climbed anything higher than an apple tree before, and then there had been an "interior" motive behind it.

"Follow me," he said. His English was perfect. We followed—bewitched, bothered and bewildered. Presently we came across the film unit of *Scott and the Antarctic*. They were packing up their equipment and calling it a day. John Mills smiled straight at me, whereupon I felt delightfully dizzy but not enough to pass out. Mary said that it was at her that he had smiled; but we had no time to argue, for Hans began roping us all together.

"Follow me," he said, and, resembling a link of the chain gang, we started to follow. How the rope could possibly have got between my legs I cannot imagine, but I was on the point of enquiring about it when it tightened and I fell flat on my face. When I got up, and Mary and the film unit had finished laughing, Hans unwound me and the rope and, muttering something in his own language with an unemotional eye on my legs, headed for the peak. In a short time we reached the foot of a peak called Mathilde.

Hans started to climb first, and he chopped holes in the snow and ice for us to put our feet in. It would have been all right if his leg stretch had not been bigger than mine: going up was one problem, lengthening my legs to suit was another.

"Walk upright," said Hans, observing the affectionate manner in which I was clinging to Mathilde. I did not bother to reply because I was too busy trying to continue breathing!

"What was it that Mahomet said?" I asked Mary as we laboured up nature's monument; but she only snorted, which I could not be bothered to translate. Breathlessly we continued skywards and, just when I was mentally reading the headlines in the *Daily Mail* about an unfortunate accident in Switzerland, Hans said "We will sit" in perfect English. Whatever language he had said it in I should have sat at that moment.

"Now," he said, "look around at the view—it's breathtaking." How doubly true! The view was certainly wonderful, with the lower mountain peaks sticking through clouds of cotton wool. It was like sitting on top of the world. We rested. They say what goes up must come down, and we had a train to catch and the only way not to miss it was to get down that there peak.

Mary went first going down—Hans last. I was fortunate enough to be still in between. Then I had some trouble with a rock. I mentioned to Hans (quite calmly) as I hung on by my finger-tips that the "perfectly gut foothold" he kept saying was there must have been on some other rock he once knew; but he replied "Nonsense,

I.C.I.'S NEW COPPER TUBE MILL (continued from page 293)

A plug or mandrel fitted into the die keeps the inside diameter constant.

The most powerful tube-drawing machine in the world is indeed an impressivesight. (It might almost be called a view, as about a hundred paces are needed to take the spectator from end to end!) Nearly 250 ft. long, surrounded on all sides by racks, ramps, mechanical tippers and the inevitable hovering cranes, it is a study in perpetual motion.

Three at a time the shells are dropped on to a narrow runway and fed into the dies; the ends are grabbed by a quaintly named but fast-moving "wagon" which pulls the tubes through the die on to a second runway. Slightly attenuated, they are released into a trough, bundled like firewood, and lifted back into position for another draw. By the time they have gone through three or four circular tours they will have lost about an inch and a half of their girth and more than doubled their length. From first to last they are scarcely touched by hand. All the ceaseless activity, all the marshalling, lifting and carrying, is accomplished with no more physical effort (though, of course, with considerably more know-how!) than is needed to press a button.

With the three basic steps of casting, piercing and drawing behind it, the product is now a tube. Fundamentally, all that remains is to repeat the drawing process until the dimensions meet the customer's requirements. For tubes an inch or more in diameter this is done on one or other of the smaller drawbenches—an adjective which is purely comparative, as Kirkby's second and third benches can exert a 100,000 lb. pull and draw tubes out to a length of 160 ft.

Tubes wanted in a smaller size are coiled at this stage to make handling easier and transferred for their final draws to a bull block. Here the long runway of the drawbenches is replaced by a rotating drum which, bobbin-like, hauls the tube through the die. Once again the degree of mechanisation is almost uncanny. Few articles could be less amenable to discipline than giant springing coils of metal, yet here they take and change position as neatly as a well-trained chorus.

Now this, of course, is not the whole of the Kirkby story, for the three-point plan of tube production demands

the rock has been there for ages, and I know every inch of it." Once more the fatal headlines flashed in front of my eyes, only this time I chanted them to the tune of a familiar hymn. The rock and I then parted company and, dangling effectively on the rope, I was lowered by Hans (bless him) on to a rock beneath. From there we retraced our tracks in the snow (except mine, which looked peculiar) and made our way to the plateau without further mishap.

The rest of the 11,000 ft. downwards we completed by train. Well, we could hardly waste our return tickets, could we? It had been a most uplifting experience. And I found something else out too. It will not be yours truly who plants the next flag on Everest!

several subsidiary processes. Before they can be pierced, for instance, the copper billets must be first trimmed and then heated until the metal is plastic; before drawing, the shells must be thoroughly cleaned and have one end squeezed to a point which will go into the die hole. Finished tubes often need straightening and cutting to length, and all must be examined and tested before they are packed for despatch. All these jobs are fitted ingeniously and without a wasted moment into the main line of production.

Then Kirkby has its "specials"—copper rollers for textile printing, long a famous product of the factory's ancestor at Broughton, and 'Integron' finned tubing, most recent addition to Metals Division's list of tube products. These, unsuitable subjects for mass production methods, are made in a separate building which also houses the toolroom.

Special, too, in their way are Kirkby's non-production units. The office block, though clearly functional with its wide metal windows and practical 'Holoplast' partitions, presents a handsome face to the outside world: clean, uncluttered lines and softly shaded brickwork ensure that the factory is no blot on the landscape.

And the inhabitants? There are nearly a thousand of them now, and though the vast majority of them are newcomers not only to I.C.I. but to the industry, they are already welded into a community with a character all its own. One reason for this early flowering of a distinctive Kirkby tradition is, of course, the inspiration of novelty—new industry, new factory, new plant. Another is the care taken in recruiting and training personnel. Every new employee comes on a month's probation, during which he and the management can assess the most promising outlet for his skill. When a suitable job suggests itself, the newcomer is fully and systematically trained so that he can do it with pride and satisfaction.

The factory has been in large-scale production for less than a year and at the peak of its power for only a matter of weeks. When teething troubles have passed into history, when newly acquired skills are burnished by experience, there is no doubt that Kirkby Works will be a tremendous asset.

Garden Notes

By Philip Harvey

Illustrated by Bruce Petty



SOME textbooks declare firmly that maincrop potatoes are not worth growing in a small or medium-size garden. They are so cheap to buy (unlike the earlies) that where space is at a premium one should forget about them and devote the ground to something else.

These misguided writers forget one very important point. Most people garden to satisfy their longing for beauty in the case of flowers and shrubs, and to provide vegetables and fruit for home consumption, irrespective of shop prices. The economics of gardening seldom worry us unduly, as hobbies generally are not expected to show a profit and loss account. For my part, I like growing the maincrop potato Golden Wonder because it is about the best eating potato in existence, with a fine floury flavour. What if this variety requires liberal manuring and crops unevenly? It is still worth extra attention from every gardener who can distinguish between soapy and floury potatoes.

Maincrop potatoes are ready for lifting when the haulms have died down. If you are at all doubtful, dig up one or two tubers. They are ready to lift if the skins hold firmly to finger or thumb. Always lift in dry weather, first cutting off any haulm and burning it to prevent spores washing down to the tubers.

Do not be in a hurry when lifting. I know this advice sounds elementary, but it is surprising how many gardeners drive the fork

into the tubers. Use a fork with long prongs which gets well underneath the tubers. Leave them on the ground for a few hours, but move under cover if rain is imminent. Obviously in damp weather the skins will take a day or so to dry.

Never store any tubers with the slightest traces of disease. For example, a reddish brown discoloration in and under the skin shows that blight is present.

If you are contemplating putting in some roses this autumn, prepare the ground without delay. Some authorities recommend digging and manuring the ground months beforehand, presumably on the assumption that most gardeners have plots of vacant land just waiting for roses, fruit trees or any other crop. Such advice is absurdly idealistic. There is not the slightest need to prepare the soil a long while beforehand.

The most important point is to ensure that the ground has time to settle before any planting is attempted, and you should therefore have all digging and manuring finished say three weeks in advance of planting. You can, of course, work in manure, compost, etc., and plant immediately where isolated bushes are concerned, but prior soil preparation is always best.

Deep digging is essential. Rose roots can penetrate as deep as two feet, with an equal lateral spread. Obviously all weeds, whether

annual or perennial, must be removed, the annuals going to the compost heap and the perennials like couch grass, ragwort and docks consigned to the bonfire.

Roses demand a cool root run. Break up both spits really thoroughly, especially where there are lumps of clay. May I disillusion anyone who still thinks that clay is essential for first-quality roses? Solid clay is bad for the roots. They simply become thick and woody or fail to extend properly. A mass of fine, fibrous roots is the ideal, so do not grudge any backaching work breaking down these seemingly intractable lumps of soil.

If you can secure any farmyard manure, make certain that it is well rotted, as fresh manure will burn the roots. Break up the manure and mix freely with the soil, keeping it well below the roots.

Compost, chopped turves, hop manure and peat may be incorporated in both spits. Damp peat worked among the roots is a tremendous help in hastening the formation of new roots. Bonemeal and sulphate of potash may also be added to the top spit.

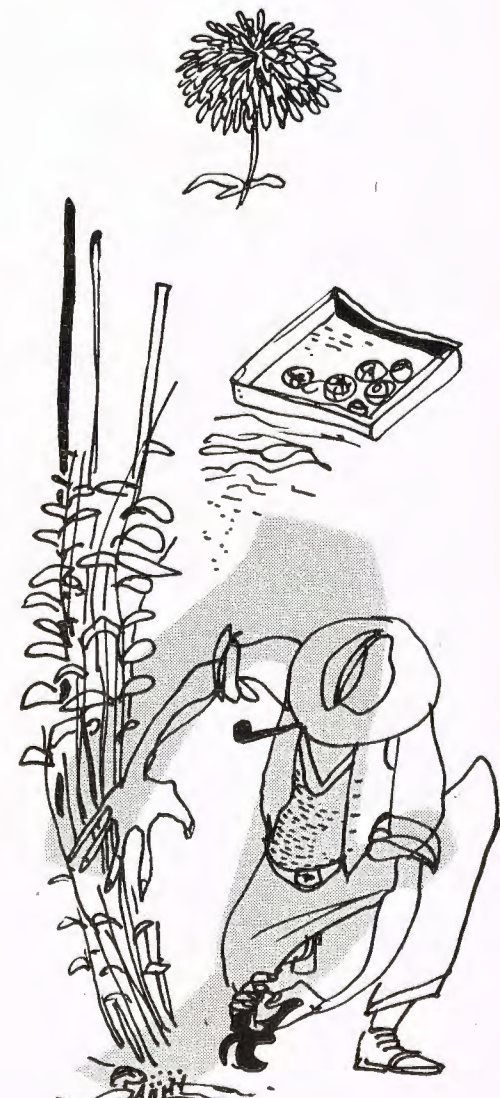
Do not plant on a raised-up bed, otherwise the rose bushes will suffer from dryness at the roots during a drought. Avoid planting near trees, as there will be too much shade for the roses and very little nutriment in the soil. Lastly, never plant Wichuraiana ramblers like Excelsa and Dorothy Perkins

against a wall, especially a house wall. They will be a mass of mildew, and in a hot summer aphids and red spider will stage a major attack. Climbers are best for walls; ramblers for arches, pillars, pergolas and fences.

Daffodils ought to be planted by mid-October (tulips can wait a week or two longer). Do not judge the worth of the bulbs by their size. For example, Cornish bulbs are earlier and smaller than Northern Ireland specimens, while those from Wisbech and Spalding are generally in between. As with rose trees, it does not matter where you buy your bulbs provided they are sound specimens.

Gardeners are sometimes worried about the planting depth for daffodils. The general rule is to plant two and a half times the depth of the bulb, slightly deeper on very light soil and more shallowly on heavier ground. Incidentally shallow planting ensures quicker increase of the bulbs.

Gladioli should be lifted this month, the best time being when the foliage is almost entirely brown. Hang them up to dry in a frost-proof shed or other outhouse, and directly the foliage has withered cut off the main stem about half an inch above the new corm. The corms can then be stored in any cool, frost-proof place in boxes or trays. A dry, warm atmosphere leads to shrivelling of the corms.





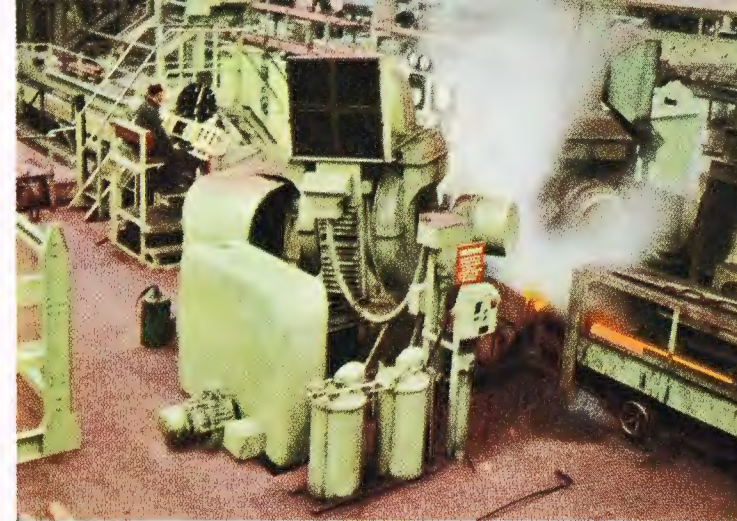
LOOKING EAST DOWN THE MAIN MILL. On the left is one of the drawbenches. Three copper tubes, 2 in. or more in diameter and about 35 ft. long, are fed in and under a pull of 100,000 lb. drawn out to a length of 160 ft.



A RIGID MAST CRANE loading coiled tubes on to storage arms



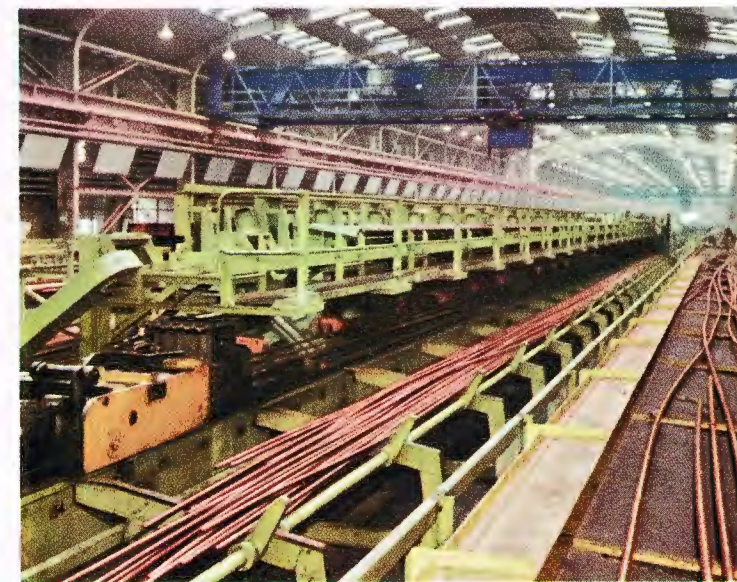
CASTING COPPER BILLETS. Slabs of virgin copper are fed continuously into the furnace and melted in an electric arc furnace. All the time molten copper trickles from the open mouth of the furnace down twin runways into waiting moulds. The caster directs the flow so that it fills each mould in turn.



PIERCING THE BILLET, in other words making a hole down its centre. This is the first step in the production of a tube.



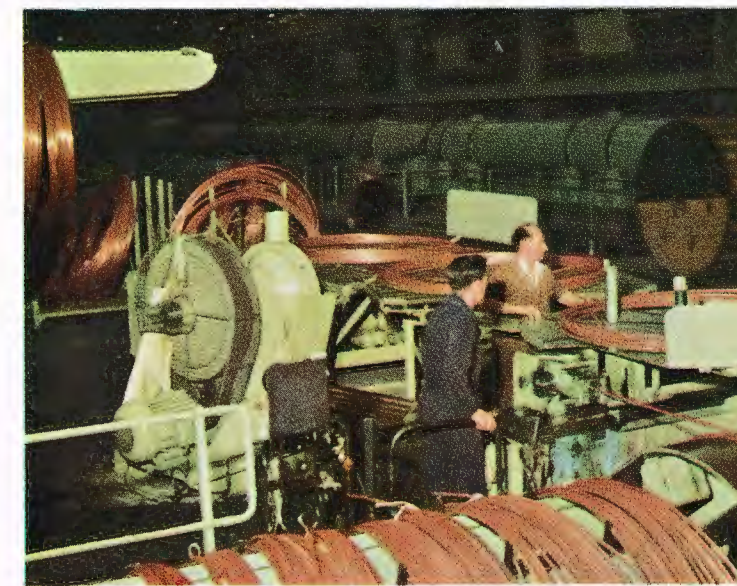
AFTER PIERCING, the billet is known as a shell. It is then "quenched" in a bath, for cooling and cleaning.



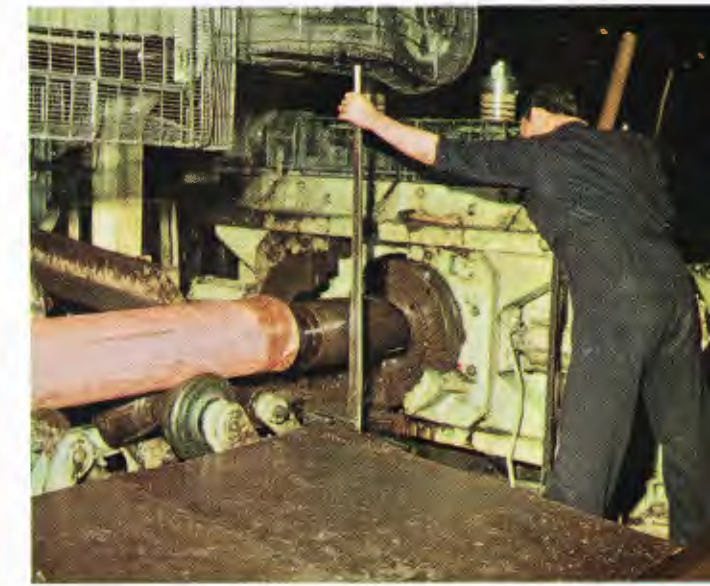
150 FT. LONG TUBES being drawn, three at a time, on No. 2 drawbench



TWO OVERHEAD CRANES working together to lift 150 ft. lengths of tube



SMALL-DIAMETER TUBES being drawn on a bull block. The coiled tube is transferred by rigid mast crane to storage arms.



PREPARING TO REMOVE a large-diameter tube after drawing on the hydraulic drawbench

MONTREAL

By P. C. Allen (Fibres Director)

Colour photograph by courtesy of Canadian Industries Ltd.

"I would gladly come back—any time" writes P. C. Allen concerning Montreal—that most individual of cities, with its superb situation on an island, with the great hogsback of Montreal mountains at the back and at the foot the mile-wide St. Lawrence river.

It is usual to say that Canada is half-way between the United States and the "Old Country," as Canadians are so often proud to call Britain, and it is easy to find examples to illustrate this proposition. There is for an Englishman a wonderfully warm and touching fellow-feeling with Canadians that you cannot miss. Although the French Canadians are a people apart, you cannot mistake the Britishness of the others, the real affection for Britain—if not always for the individual Briton—the real and unaffected ties with the Crown and with English institutions, shown in such little things as labelling the roads in Ontario "King's Highway No. —"; all this in spite of an almost overwhelming economic pull towards the great neighbour to the south.

The hundred and fifty million people with their huge industrial machine below the three thousand miles of unfortified border exercise a vast effect in taste, fashion, supplies of goods and services and the material things of life, but sentiment still prevails in so many of the other things that for an Englishman coming into Canada from the United States it is almost like coming home—almost. For one thing, the atmosphere of the Melting Pot is absent and the very names over the shops are reassuring—the Laprairies, the Eatons, the Smiths and the McEwans.

I have a deep affection for Montreal ever since I spent some months there in the early 1930's, and it is always a great moment when the train rumbles over the Caughnawaga bridge with a glimpse of the dark swirling river below and you know you are back.

I shall always remember the first time I saw Montreal on a brilliant May evening in 1933, looking out over the city half hidden in the new green of the trees, then the great pale blue river with the green wooded

shore beyond with its two odd knobs of mountain sticking up out of the alluvial plain, and then far away on the southern horizon, shining like crystal in the clear air, the mountains south of the border, the mountains of America, the fringes of the White Mountains, the Green Mountains of Vermont and the Adirondacks. In *Eastern Approaches* Fitzroy Maclean conjures up a far more magnificent but perhaps in some measure a similar scene:

Far to the south, dimly seen in the remote distance, towering high above the desert, rose a mighty range of mountains, their lower slopes veiled in cloud and vapours, their snow-clad peaks glittering in the sunlight suspended between earth and sky. These were the Tien Shan, the Mountains of Heaven. At their foot lay Alma Ata, beyond them Chinese Turkestan.

You are not in Montreal long before you appreciate that you are in the second-biggest French-speaking city in the world. Its population is over a million, and three-quarters of these are French Canadians.

The predominance of the French in Montreal shows itself in the persons of the public servants, the tram drivers and the police and in the bilingual notices which you see everywhere. It is not enough to put up a simple notice like NO PARKING on a lamp-post; it must also say DÉFENSE DE STATIONNER. One notice at Westmount Station says ^{TO THE} TRAINS, _{AUX} which is hard to believe; but the use of both languages is a serious affair and an essential part of the French



A VIEW OF MONTREAL CITY, looking south towards the St. Lawrence river and the Victoria Bridge

Canadians' determination to keep their individuality. At a six-day bicycle race or a hockey game in Montreal there are shouts of "En Français!" after any announcement, however simple, in English, and the uproar continues until the announcement has been repeated in French. At one of the country clubs near Montreal where the members are mostly French the golf cards eschew English altogether, bidding you *Remplacez le gazon* and *Nivelez le sable dans les trappes*.

The French Canadians are certainly a people apart and a people with many admirable characteristics. About sixty thousand strong at the fall of Quebec in 1759, they have multiplied, almost unaided by immigration, to over three million people today. Predominantly they were, and still are, hard-working, thrifty, conservative, devout peasants, peasants with large families—twelve, fifteen or even twenty children used to be common—but, with growing industrial development, changes are coming in the old pattern, and more and more Canadiens are becoming industrial workers or truck drivers instead of labouring on the

narrow strip of family farm, and engineers instead of lawyers or doctors, the favourite professions of the previous generation.

They have clung fiercely to their rights guaranteed by the Constitution to keep their own language and their own laws—the last, by the way, notoriously indifferent to married women's property, so that sometimes the English-speaking of Montreal slip over to Ontario to get married. For generations the French Canadians had the natural distrust of a defeated minority—defeated but not crushed—of the good intentions of their English conquerors; this distrust blazed up into the anti-conscription riots in the Kaiser's war and appeared again as a surly dislike of the Draft in Hitler's. After all, the Canadian finds little to admire in Europe, for he has no fellow feeling for the France, secular and unstable, which replaced the France of 1789 any more than for Britain, so the indifference or dislike for Europe's wars is not surprising.

Perhaps most of all, Quebec distrusts the Great

Assimilator below the border, for they know well enough that if they ever became the 49th State, language and laws would be gone inside a generation. French Canada is left, therefore, with an introspective nationalism and no allegiances or ties with the rest of the world save that of a strong and genuine adherence to the Roman Catholic Church. Manifestations of this religious feeling are visible everywhere in Quebec Province, and one of them has been the construction in Montreal of a one-third-scale model of St. Peter's in Rome, and a pretty big church it is too!

One of the strange things about Montreal is the feeling of "northness" which pervades the place, for although the city is of about the same latitude as Lyons or Milan, there is to me the slightly menacing feeling that a little to the northward man is powerless and that harsh nature is crowding down into the busy streets. And this is indeed true, for a hundred miles or so due north of the city the road peters out, and then there is hardly a mark of man's activity as far as the North Pole save for a single line of east-to-west railway cut through the bush about a hundred miles further on.

Beyond the road civilisation ends, cultivation disappears, and all is rock, bush, lakes, and vast hidden mineral wealth. This is the area of the great Precambrian Shield, a huge waste of ancient rock which overlies a great part of Quebec Province, so that all the area that corresponds in latitude to, say, northern France or Germany or the British Isles is useless for cultivation or for supporting a population, though its store of minerals is great.

A friend of mine went for a motoring holiday up into this northland some years ago, into the Shield from Ontario; after driving for some days he reached the end of the road and felt that he must be nearing the Arctic Circle, but when he got home and had a look at the atlas he found as he said "that he'd got no further north than Paris, France." The climate too in this fierce region is harsh, very continental, and bitterly cold in winter. In summer the mosquitoes and black flies can be intolerable. It is only further west in Alberta that geology and climate will permit a living to be got as far north as Glasgow and Copenhagen.

The vast emptiness of Canada is an impressive thing. I remember as we came up the St. Lawrence on my first visit we sighted the Gaspé coast of Quebec. Smoke was visible, and in my ignorance I suggested to a friend that there must be towns there. "No," he replied, "those are forest fires," and added: "The

coast there is one of the remotest in America: they have just built a road round it, but fifty yards off that road and you can find yourself somewhere where no white man has ever been"—and that in 1933.

On a recent visit to Montreal I came by the day train from New York—one of the best ways to go if you can spare the time, for the country through which you travel is very fine at any time of the year.

By the time we reached Montreal it was dark and sharply cold, the day's thaw had refrozen on top of the hard packed-down snow, and the streets were covered with slippery glazed ice so that the taxis and traffic spun their wheels and skidded all over the place. The air nipped the ears, the police and others wore fur caps, and red Mackinaw jackets could be seen in the streets. So it continued during the week, and although the Canadians assured us that it was not cold, I knew better: on those days when a wind blew it was enough to sever the ears as one plunged head down along the slippery streets, over the piles of snow in the gutters, through the thaw water unable to run away, dodging the cars sliding about with their wheels locked.

The day we left Montreal the sheer malignity of the weather had something majestic about it. It was a really appalling morning, with a bitter north wind blowing the snow in horizontal streams across the open plains of southern Quebec; outside the windows of the train it was like one's imagination of Canada, though not of more than half-way through March; there were sleighs, hooded and muffled figures bent to the storm, ear muffs and fur hats. At Windsor Street Station there was a sense of battle in the air, the giant engines high above the low platforms, their cow-catchers, wheels and underframes choked with snow, clouds of steam, trains double headed for battling the storm, bulletin boards showing hours of delay—the "Dominion" from Vancouver two hours late, the "Montreal Limited" from New York an hour and forty minutes late.

The next day it snowed again, and I made a vow to avoid March in North America in future if at all possible. But a few days later, after the shipboard party and the sad farewells, we sailed from New York at midnight, and soon afterwards, looking from my porthole as we relentlessly slipped away, I saw dark water, lights ashore, a setting moon, and huge and black, with a great light at its summit the Statue of Liberty, and I felt I would gladly come back—any time.

I.C.I. NEWS

"ENDEAVOUR" ESSAY PRIZES

At the British Association's annual meeting in Bristol last month the president, Professor Sir Robert Robinson, presented prizes to the winners of the essay competition sponsored by *Endeavour*, I.C.I.'s international scientific review.

The competition (the sixth *Endeavour* has sponsored) was for young scientists only and had the object of both stimulating their interest in the work of the British Association and encouraging the writing of good English.

The first prize was awarded to Mr. A. N. Glazer (19) for an essay on "Respiration." Mr. Glazer is a student at the University of Sydney, where he is studying biochemistry. He was unable to be present to receive his prize personally, but was represented by Mr. W. Ives, chief scientific liaison officer at Australia House, London.

Mr. D. Hull (23) won second prize for his essay on "New Metals for Engineers." A student at University College, Cardiff, he is doing post-graduate research in metallurgy.

The third prize was awarded to Miss I. A. Davies (23) for an essay on "Man-made Fibres." She is a graduate of the University College of Wales, Aberystwyth.

In the junior section prizes were awarded to J. F. Ross (16) of Fleet and P. I. Vardy (17) of Ashton for essays on "The Earth's Magnetism" and "Respiration."

BILLINGHAM DIVISION

I.C.I. offers Help to Tees Water Board

Billingham Division and Wilton have suggested that the Tees Valley Water Board should consider building one, or possibly two, more reservoirs in the Pennines to ensure future water supplies for industrial purposes and



"Endeavour" essay prizewinners at the British Association meeting. From left: Mr. D. Hull, Dr. T. I. Williams (editor of "Endeavour"), Miss I. A. Davies, Sir Robert Robinson, Mr. P. I. Vardy and Mr. W. Ives (representing Mr. A. N. Glazer).

have intimated that the Company is prepared to contribute to the estimated cost of about £12,000,000.

Mr. E. A. Blench, Billingham Division Production Director, says the announcement puts on record the approach made by I.C.I. on the still difficult question of future water supplies, and adds: "The managements at Billingham and Wilton feel that although the considerable expense in exploration and planning will have to be borne by I.C.I., the Water Board should be asked to undertake this work with some urgency so that our expansion will not be impeded."

Alderman C. W. Allison, chairman of the Water Board, revealed the Company's suggestion when the board was making its annual inspection at Lartington. He said that the Company had tentatively offered to pay towards the redemption and interest on the capital cost of the new reservoirs in proportion to the water consumed.

The Company has also offered to undertake an aerial survey of one or both of the two suggested sites at Blake

House in Lunedale and at Balderhead in Balderdale. Both sites are a few miles west of Middleton-in-Teesdale and are near the Selset reservoir scheme, on which construction began this year.

Alderman Allison intimated that if reservoirs were developed on the two sites the water would be not only for I.C.I. but for Tees-side generally and would be largely to prepare for the future demands of heavy industry. He said that the Water Board would have to give the matter very careful thought, and his own view was that the board should agree to investigation being made of the two sites.

In Lighter Vein

The proverbial needle in a haystack would be easier to find than a cigarette lighter in a truckload of Concentrated Complete Fertilizer. So thought Miss Lillian Dack when she learned that a lighter she had lent to loader Harold Stoker in the phosphate packing shed at Billingham had been lost in the truck he was loading.

But ten days after the lighter had been lost a package arrived at *The Billingham Post* office. It was from a farm



Miss Lillian Dack (right) shows friends the lighter returned from a Suffolk farm

foreman in Suffolk who had recently been featured in a "Post" article on the use of CCF. Inside the package was a letter which said:

"Sir: I had a truckload of CCF delivered at Finningham Station, Suffolk, on 18th August, and inside the truck was written that a lighter had been lost. One of my men found it and handed it to me. I am forwarding it to you in the hope you can find the owner. Yours truly, Old Jack."

Miss Dack was able to recognise the lighter as her own by a dent in its side. The only thing she regretted was that she had just bought a new lighter!

DYESTUFFS DIVISION

Professorial Appointment

The recent grant of a royal charter to the Manchester College of Technology, which is the Faculty of Tech-

nology of the University of Manchester, has been followed by the formation of a new chair of textile chemistry there, and Dr. R. H. Peters, at present in charge of the Dyeing Research Section of Dyehouse Department, has been appointed first Professor of Textile Chemistry and Director of the Laboratories in the Faculty of Technology.

Dr. Peters was educated at Ilford County High School and West Ham Municipal College, whence he went to King's College, London. In 1939 he was awarded a B.Sc. (Special) degree with first-class honours in chemistry and in 1942 the degree of Ph.D. Meanwhile, in 1941, he had joined Dyehouse Department.

Dr. Peters, always keenly interested in the academic world and the industrial arts, became a part-time student at the Manchester College of Technology and in 1944 was seconded to the College, where he worked with Dr. Neale on certain aspects of the physical chemistry of textile fibres until his return early in 1945. He gained the London degree of B.Sc. (General) in mathematics and shortly afterwards entered the University of Manchester and obtained the Dalton Mathematical Scholarship in 1947 and a B.Sc. degree with honours in mathematics in 1949. Dr. Peters then rejoined the Division and was appointed Head of the Dyeing Research Section in 1952. He was awarded the Research Medal of the Worshipful Company of Dyers in 1953.

Spondon Works to Close

After careful review it has been decided to discontinue the manufacture of iron oxides at Spondon Works, and their production will cease as soon as practicable. Bearing in mind the aims of causing the minimum of disturbance to employees as well as to the customers of I.C.I. who are involved, it is expected that iron oxide manufacture will stop entirely in a few months' time. Alternative work will be offered to employees at Spondon Works and particular regard will be paid to the circumstances of each individual.

Spondon Works, which is about three miles from Derby, is the Division's smallest factory. Iron oxides have been made there for very many years, and much of the plant is now old and uneconomic to run. The history of the original firm goes back to 1864, when Mr. Charles Leech, a commercial man, and Mr. Thomas Neal, an engineer, started independent businesses for making paint and colour in Derby. Shortly afterwards they amalgamated and were joined by Mr. O. Lilley, a manufacturer of iron oxides from London, who started making these first at Derby and then on the present site at Spondon. The company traded as Leech and Neal for a number of years, and the manufacture of iron oxides became the



Dr. R. H. Peters



Spondon Works, near Derby, which is soon to close down

most important part of the business. In 1888 the business was sold by a public issue of shares and became Leech, Neal & Co. Ltd. It was acquired in 1936 by what was then known as the Dyestuffs Group of I.C.I.

METALS DIVISION

Beating up the Channel

Whether Midlanders or not, readers will recall Bill Pickering's fine Channel swim on the night of 26th August which set up a new world record for the north-south crossing.

Witton is basking in a little reflected glory from the event, for Bill's friend and trainer, Lewis Latham, who accompanied his man through that long night, works in



Trainer and record-breaker: Mr. Lewis Latham tends Bill Pickering during his record Channel swim.

the Fitting Shop there. Mr. Latham fed and encouraged the swimmer to such effect that he landed at Cap Gris Nez in just over fourteen hours, considerably fresher than the average daisy.

Mr. Latham, indeed—who had ridden across—was the more jaded of the two. The Channel had been so rough for so long that hope of making the attempt had been abandoned, and Lewis had returned to Birmingham. Then the waters relented; he received an urgent telegram of recall, leaped on his motor cycle en route to Dover—

and took a hefty toss on the unwelcoming cobbles of Chatham. But he arrived at St. Margaret's Bay in time to cross with Bill in the teeth of a force 5 wind.

Journalists see New Works

Kirkby Works (fully described in this month's leading article) was "at home" last month to the Press and families of employees.

On 14th September representatives from fifty newspapers and journals toured the works; the following day was "family day," and 750 wives and friends of Kirkby employees were shown over the factory.

Dr. A. R. Beeching, chairman of Metals Division, explained when he welcomed the Press that although the works had been in production for some time it had only recently reached full production. He paid tribute to the numerous people who had shared in designing and building the factory, many of whom were present.

Enlarged Horizons

Last year Metals Division—in co-operation with the Birmingham branch of the Royal Institution for the Blind—conducted an experiment which is believed to be unique in this country.

With the object of enlarging the scope of employment for blind people, the Institution (with the whole-hearted approval and backing of I.C.I.) selected a number of girls to go to the 'Lightning' Fastener factory for two-month courses. They were trained in a wide variety of operations normally performed by sighted girls, including assembly and presswork (foot and power). To everyone's surprise and pleasure they proved phenomenally quick in attaining these skills, the training period being substantially shorter than that required by the average sighted worker.

The Institution authorities, delighted with the result of the experiment, now seek to extend it to other firms.

NOBEL DIVISION

Renfrewshire Stradivarius

Mr. Tom G. Fraser, works superintendent at Nobel Division's Crosslea Mills, Renfrewshire, loves making violins. But he cannot play a note on them himself.

Violin-making has been Mr. Fraser's hobby for many years; but since he moved to Houston from Paisley he has had no workshop, and of an evening, perhaps, when he would like to carry on with his hobby the kitchen has to be cleared, tools and materials got out and vice set up. By the time he is ready to start, it is almost time to begin clearing away. But absence of facilities makes the heart grow fonder, and Mr. Fraser is searching for a workshop where his wood, glue, varnishes and tools can be always to hand.

In his time Mr. Fraser reckons he has made something over thirty violins. Some of them, he admits, went to the stove as soon as they were completed; others are being played in various houses in and around the country.

He has had no training of any sort as a woodworker. Often in his earlier days he spent his leisure hours in the workshops of two of Glasgow's leading violin-makers, watching how the violin is built up. At times he did violin parts—scrolls and the like—for them; but that is all.

From one of these makers he gets most of his raw materials. The ideal wood, he says, is maple from what used to be Herzegovina—now part of Germany behind the Iron Curtain. No maple has come from there for a



Herzegovina maple, Glasgow varnish and hard work are the ingredients of Mr. Tom Fraser's violins

long time, but Mr. Fraser has access to a supply that will last his light requirements a long time yet. Before the war he was offered a consignment of glue, which he took, and it is still lasting out.

Then varnish. The popular idea is that the secret of Stradivarius' violins lay in the varnish he used. Mr. Fraser has his doubts, and in any case he thinks that violins made by certain English craftsmen are as good as anything turned out by the famous old violin-maker of Cremona. There is no secret about the varnish Mr. Fraser uses, or where he gets it: Glasgow.

Help given in Galleon Search

If the galleon sunk in Tobermory Bay is discovered, Nobel explosives will have opened the door to a 400-year-old secret.

All summer a dragline has operated along the bottom of the bay searching for relics which would lead to the hulk of the Spanish galleon *Florencia* which was blown up and sank with considerable loss of life and reputed treasure in 1588.

The last obstacle to the search lay under the sandy silt



Treasure-seeking ship off Tobermory

on the bottom of the bay. It was a thick skin of compacted clay which defied the dragline and which could only be penetrated with great effort. A shallow dome of that clay excited the treasure seekers. Here, if anywhere in the bay, they might find the remains of the galleon. To penetrate the clay skin meant that some other method of attack would have to be employed.

So it was that Commander Simpson-Jones travelled from Tobermory to Glasgow and had a long talk with Nobel Division Technical Service experts at 25 Bothwell Street. This was an interesting morning for Commander Simpson-Jones and for the men whose advice he sought.

He explained the geological difficulties his divers had met on the bed of Tobermory Bay, and from their long experience of underwater blasting Mr. J. Hancock, Manager of Technical Service Department (who has since retired), and Dr. R. Westwater were able to help.

The result was that Commander Simpson-Jones returned to Tobermory with some technical advice which he soon put into practice.

Using Nobel Division Plaster Gelatine explosive that operates well under water, standard delay detonators and 'Cordtex' fuse, one of Commander Simpson-Jones' divers has blasted through the hard clay shell on the bottom of the bay, and subsequent operations have brought up two wooden beam fragments of great age, which suggest that at last the Tobermory galleon remains are nearly exposed.

PHARMACEUTICALS DIVISION

Prevention of Mastitis

Every year mastitis robs the British dairy industry of thousands of gallons of milk. This costly and troublesome disease is a constant threat to the maintenance of high milk yields, for the germs are so easily and rapidly spread that a single beast can cause an outbreak which will spread swiftly through the herd.

Veterinary research workers have shown that these germs can be found both in and on the udders and teats, on the skin of dairy cattle, on clothing, milking stools, buckets, broom-handles, churns, cleaning materials and

in fact on almost everything associated with the dairy herd. It follows that only the most scrupulous cleanliness and the adoption of modern methods of routine disinfection can keep the disease at bay.

For many years scientists and veterinary workers have tried to find the ideal germicide for use in the prevention of mastitis; now a new and powerful antiseptic known as 'Hibitane' has been developed by I.C.I., and tests with formulations of this bactericide have shown that it is perhaps the most effective yet discovered for controlling the spread of contagious mastitis. For use by farmers, 'Hibitane' is incorporated as the active agent in I.C.I. Udder Wash, from which a solution for washing the udders and teats of cows before milking, and for the rinsing of teat cups and milkers' hands, is easily prepared.

Field trials with 'Hibitane' have been carried out by Ministry of Agriculture veterinary workers, and the results were published recently in the *Veterinary Record*. These confirm that 'Hibitane' does indeed represent a significant technical advance in the hygienic control of mastitis.

PLASTICS DIVISION

Production Director Retires

Mr. F. T. Woolner, Division Production Director, retired at the end of August.



Mr. F. T. Woolner

Mr. Woolner was responsible for much of the instrumentation of the first plants at Billingham, where he went in 1922 in his third year with Brunner, Mond & Co. In those days the manufacture of industrial instruments in this country, particularly instruments for measuring the flow of fluids, was not well developed, and it was necessary for Mr. Woolner and his colleagues to design and make most of the flow-measuring instruments themselves.

In 1930 he left instrument work and became deputy works manager. When the factory expanded and was split into several works Mr. Woolner was appointed first Ammonia Works manager.

In 1939 he was transferred to the new but growing Plastics Division. There he was made responsible for all production matters and in 1940 became Division Production Director. It is a testimonial to Mr. Woolner's influence on the Division's well-being that while the number of payroll workers employed has risen sevenfold since 1939, output has increased some twentyfold.

Mr. Woolner is succeeded as Production Director by Dr. R. G. Heyes, General Works Manager of the Division since 1953.

All the Nice Girls . . .

Since the Division adopted H.M. Submarine *Amphion* during the war the crew of the submarine have made several visits to Welwyn Garden City to meet the people of Plastics Division. The most recent visit was at the beginning of April this year, when they took part in games of football, table tennis, snooker and darts. After the games a dance took place in the Recreation Club at Black Fan Road. It was at this social event that one of the submarine crew, Telegraphist Maurice Carpenter, met Miss Kathleen Smyth, a typist in the Division Labour Department. In the weeks that followed the couple corresponded and visited each other whenever possible, and they became engaged to be married.

The marriage took place at St. Giles Church, Codicote, on 20th August. Two of the three bridesmaids in atten-



Telegraphist Maurice Carpenter and Miss Kathleen Smyth leave Codicote Church after their wedding

dance were Miss Joy Wright and Miss Mary Button, works colleagues of the bride. Best man was Mr. G. Richman, a shipmate of Mr. Carpenter's.

The reception was held at the Wellington Hotel, Welwyn, and the happy couple afterwards left for a honeymoon in Sussex. Mr. Carpenter still has seven years to complete in the Royal Navy. Mrs. Carpenter will continue her work in Plastics Division.

New Use for 'Fluon'

A new use for 'Fluon' polytetrafluoroethylene, which has already displayed its versatility in all kinds of applications, has recently been discovered.

A large fleet of cars was suffering from trouble with throttle controls, which meant considerable maintenance and sometimes complete replacement of cable units. In an attempt to overcome the difficulty the inner cable of one control was coated with a film of 'Fluon.' When this was fitted to a car it proved to be very satisfactory, giving a smooth movement, free from all tendency to stick and become stiff. The other cars were fitted with similarly treated controls and have since completed several thousand miles each with no maintenance.

The results of the experiment on throttle control cables have been so good that it is considered that such an application of 'Fluon' to other cables will show great advantages, especially in those cases where very sensitive control is necessary.

NEWS IN PICTURES



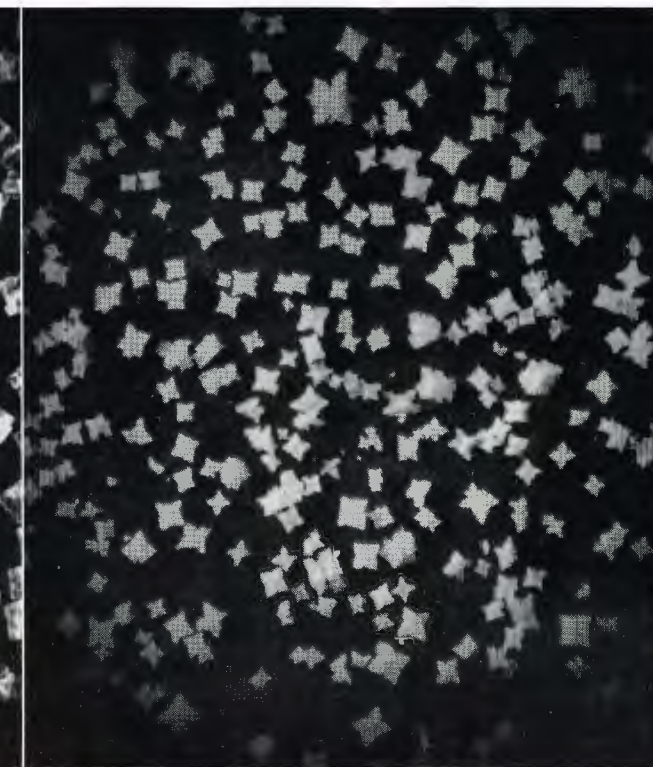
The famous old tea-clipper "Cutty Sark," now in dry dock at Greenwich for restoration, is being resheathed with Muntz metal donated by I.C.I. and made at Landore Works. The 600 sheets of copper-zinc alloy were the last to be made at Landore. Above: "Cutty Sark" in dry dock. Right: Resheathing in progress. I.C.I. also gave £500 to the "Cutty Sark" preservation fund



New headquarters offices for Paints Division will be built soon at Slough. The Y-shaped building with four floors will house a staff of 500, should be ready for occupation in 1957. Access to the factory site will be by a tunnel under the road



I.C.I. stand at the British Trade Fair now being held in Copenhagen, seen here as visualised by the designer, features products of ten Divisions and displays of 'Ardil' and 'Terylene.' The products on show range from salt to condenser tubes



Star turn. A new brand of I.C.I. salt, 'Stella' Table Salt, is now being sold in Northern Ireland. Highly magnified view of the crystals (right) shows their star shape, compared with cubic shape of ordinary table salt (above). Tiny branches on the stars hold the grains apart and prevent hard lumps forming. 'Stella' is also finer than ordinary table salt because the crystals are smaller. It is made by the vacuum process, in which brine is evaporated by steam heat in a partial vacuum



Conveyors at Kilindini Harbour, Mombasa, have been built to take Magadi soda ash from storage sheds to quayside. Vessel above is "Southbank," loading 5000 tons of ash for Indian market. Picture on left shows quayside end of conveyor. Magadi Soda Co. is largest exporter of chemical tonnage and one of largest industrial concerns in E. Africa. (Photos by courtesy of E. African Railways & Harbour Administration.)



Head office telephone lines, for the first time since 1939, all lead to a single exchange at Millbank (above, right). Exchange has 1200 extensions, is manned by 18 operators.



By contrast, Miss Toos van der Wal (left) copes single-handed with the 60 inside and seven outside lines at I.C.I. (Holland)'s Rotterdam office by means of compact Swedish installation.



Steamer captain Walter Minshall of Alkali Division was voted phillumenist (matchbox label collector) of the year by enthusiasts throughout the world and has been presented in London with an international trophy. He owns 34,000 labels



Foster-mother. Who says rabbits are extinct? Darkie, Research Engineering Store cat at Ardeer, had two of four kittens drowned, so she hunted down a baby rabbit, placed it in box with remaining kittens. The mixed brood live happily together



Ardeer Scouts Ian Fullerton and Jim Kerr went to World Jamboree at Niagara in August. Queen's scouts Michael Twaits (Welwyn) and Anthony Oldroyd (Rocksavage) also attended



Middlewich pensioner John Royle (centre), 86, turns up every week for pension on his bicycle, on other days may cover 20 miles on shopping trips. His companions are pensioners Alf Cotterill (right) and Bill Pollitt, both 88

The White Cliffs

By Henry Maxwell (Head Office)

THIS is a true story and I am glad to be able to tell it, as it is a tribute to someone I consider to have been a very gallant lady.

It happened in Dover in the middle of the war, when Dover was within range of the enemy guns across the Channel and when it was the target of almost daily attacks from the air. Gone were the summer visitors and the cross-Channel passengers, and only those whose duty or whose business compelled them to stay remained.

I had come down on some errand of civil defence, and as it was my first visit since the war began I looked around at all the damage and destruction with a heavy heart. What a contrast with the happy days of peace, and what a terrible ordeal for Dover's citizens! What had become of so many of the shops and places that I remembered? What, for instance, of the little photographer's in Snargate Street that used to have so many interesting pictures of bygone ships in its window, Amos and Amos?

Everyone in Dover before the war knew Amos and Amos. The shop had been in existence the better part of a century. It had been founded by a ship's captain and carried on by his sons and daughters. Over the years it had become a real treasure-house of Dover history, with pictures of ships and sailormen beyond counting, and of great events in the life of the town. There were photographs of Prince Louis Napoleon, later Napoleon III, of Queen Victoria and the Prince Consort, of some of the weird and wonderful steamers which have at one time or another been employed on the Channel passage, and peeps and glimpses of the vanished past at every turn.

I hoped indeed that all these precious souvenirs and relics had been saved and might not be lying amidst the broken brick and rubble in which most of poor Snargate Street seemed to have dissolved. I felt I had to see for myself, so I made my way to the seaward end of the town and soon found myself in the ruined thoroughfare between the empty dock and the towering cliff.

The sun was beginning to set, and Snargate Street looked dreadfully forlorn and deserted. I found the shop of Amos and Amos. The houses and the little shops on its westward side had been shattered, and so had the houses opposite and higher up. All behind it lay in ruins. But in the broken shop window stood some photographs of very young sailors and soldiers which looked fairly recent, and in the window of the floor above were some very white and tidy curtains, from which it appeared as if there was someone in occupation.

I rang the bell and waited. There was a longish pause, and then the door was opened by Miss Amos herself. She seemed rather surprised at anyone calling and a little preoccupied and distracted. She did not remember me when I tried to recall myself to her as a frequent pre-war customer, ever anxious for prints and photographs of the Channel steamers. I told her that I had lost all my precious pictures which I had had from the shop, and asked if by any happy chance she might have some left. No, said Miss Amos, she feared they were all gone. She had only the negatives, and it would be too difficult to print from them.

"You see," she said, "I am all alone now. My brother is gone and my sister is an invalid. She has had to go away. It is really very difficult here now, and I find it very hard to keep everything tidy."

"Miss Amos," I said, looking at the devastation up and down the street, "are you really wise to stay here yourself? Wouldn't you be better with your sister somewhere in the country?" Miss Amos drew herself up and gathered the woolly shawl she was wearing closer round her neck and shoulders.

"Leave Dover?" she said, almost stiffly. "Of course I shall not leave Dover. My father is buried here, you know. He told me never on any account to leave Dover. And these dear boys here want their photographs taken to send home. If I were to go there would be no one to take them for them."

"But it must be so terribly difficult and lonely for you," I insisted, "you ought not to be all by yourself." Miss Amos softened.



"Leave Dover? . . . Of course I shall not leave Dover . . ."

"It is difficult," she confessed. "I feel quite depressed at times—I simply can't keep the house tidy. Why, only the other day I cleaned out the china cabinet and got it all straight, and then a piece of something or other fell in through the skylight and upset it all again." As she spoke she motioned to a chair in her hall on which reposed the said "piece of something or other"—a huge jagged fragment of German shell, almost a foot square.

The dusk was closing in, and Miss Amos lit a lamp. Her hand trembled a little, and I could see then the signs of strain in her face. "But at night time," I protested. "What do you do at night? You ought not to stay here by yourself. I hope you go to the shelters?"

"No," said Miss Amos, with a half-wistful but determined little smile. "No; I went once, but I shan't go again. I didn't like the *atmosphere* there. The young people—oh, I have nothing to say *against* them, they are very good really; but—well, I find their conversation just a little *free*. I can't really express it, but it's not *quite* what I have been brought up to. They seem just a little familiar. They are fine

young people, and among themselves no doubt it is quite all right; but I am not so young as I was, and I don't *follow* them. You understand?"

I looked again at her hand, which trembled ever so slightly as it drew the shawl tighter still round her throat, and at her eyes, which were so unmistakably strained, and I said to her "But, Miss Amos, you should not be all alone here night after night like this. However brave you are, you must be afraid all by yourself."

I had touched the spring. Miss Amos very nearly, but not quite, broke down.

"Oh," she said in her distress, "I ought not to admit it—a captain's daughter as I am—but I cannot help it. I *am* afraid, I just can't help it. Last night I don't know how I remained in the house. I never got a wink of sleep. It's on account of the houses next door being shelled like that, and the garden all in ruins and the wreckage in the street—there's nothing I can do about it, and I am ashamed to tell you, but there it is—I know—I positively *know*—that at night MICE come into the house!"



"Lone Visitor"

Photo by A. Walker (Billingham)